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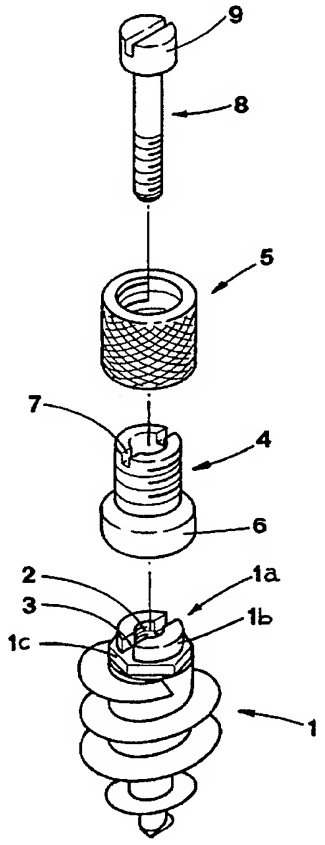
(54) Title: METHOD FOR MAKING IMPLANT PROSTHESES AND DEVICE FOR CARRYING-OUT SUCH METHOD

(57) Abstract

The method provides to apply a plurality of endo-osseous screws (1) to the patient's osteo-gingival area, the endo-osseous screws being provided with respective tubular spacer cylinders (4) mounted by fixing screws (8) and carrying respective ring nuts (5) screwed thereon. Then, a provisional connection bar (11) is made, of calcinable material, in which there are incorporated the ring nuts (5); the connection bar (11) is then removed from the endo-osseous screws (1), by unscrewing the fixing screws (8), and the spacer cylinders (4) are taken out from the ring nuts (5). Beginning from a cast formed about the connection bar (11) of calcinable material, a final connection bar (12) is made by melting the bar (12) incorporating the ring nuts (5) in the original position and orientation. The connection bar (12) is mounted on the endo-osseous screws (1) in which the spacer cylinders (4) have been previously inserted, screwing the spacer cylinders (4) in the ring nuts (5) of the bar (12), and finally, the connection bar (12) is mounted by screwing the fixing screws (8) which pass through the spacer cylinders (4) and engage the endo-osseous screws (1).



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METHOD FOR MAKING IMPLANT PROSTHESES AND DEVICE FOR CARRYING OUT SUCH METHOD

TECHNICAL FIELD

The present invention lies in the technical field concerned with the manufacture of implant prostheses. More particularly, the invention relates to a method for making implant prostheses and to a device for carrying out such method.

BACKGROUND ART

It is known that in the odontology field, for the application of the dental prostheses, there are commonly used a plurality of endo-osseous screws inserted surgically in the osteo-gingival area. Such screws preferably have respective stumps that support the related prosthesis.

Generally, the prosthesis is constituted by a bar that joins the above mentioned stumps to each other, and that has attached thereto an exostructure, or outer structure, carrying the actual dental elements.

Besides fixing the exostructure, the connecting bar determines the distribution of the forces acting on the prosthesis, e.g. during the mastication process.

Once it was used to fasten such connecting bar to the exostructure by means of a cement, while more recently the connecting bar is fastened by means of very small fixing screws.

The connecting bar is made of metal material, in particular a golden alloy, obtained usually by means of melting inside a cast mould made of calcinable material. Such cast, made of calcinable material, of the connecting bar is made in laboratory on the base of a gypsum model obtained by copying the impression taken *in vivo*.

This method causes the waste of precision because two up to four passages must take place. The main problem in carrying out the above mentioned method lies in the fact that the endo-osseous screws must be parallel.

Various methods have been used to overcome the lack of parallelism of said screws, such as the torsion of the stumps neck, wherein the stumps have a part suitably weakened, or the use of special parallelization small caps.

However, this causes a large waste of time and makes the patient feel uncomfortable because of a series of trials and tests before reaching the final result.

Moreover, another hardship is added to the difficulty of obtaining the endo-osseous screws parallelism, i.e. the possible twisting of the connecting bar, during the fusion phase, that makes impossible to juxtapose the bar and the head of the screws.

In such a case it is necessary to cut the connecting bar and then weld it again, making always the patient undergo a series of trials and tests. It is also to be noted that the beginning of pathologies, in the period following the operation,

presently provokes the waste of the whole work, since it is not possible to make corrections even if only one implant element of the prosthesis is damaged.

DISCLOSURE OF THE INVENTION

The object of the present invention is to propose a method that allows to produce an implant prosthesis, in a simple and rapid way, that does not cause any inconvenience or discomfort to the patient and does not require complex adaptations and adjustments.

The said object is obtained in accordance with what has been reported in the claims.

BRIEF DESCRIPTION OF THE DRAWINGS

The characteristics of the invention are pointed out in the following, with a particular reference to the enclosed drawings, in which:

- Fig. 1 shows an exploded perspective view of the implant unit for fixing the prosthesis to the osteo-gingival area;
- Fig. 2 shows a longitudinal section view of such implant unit in a mounted configuration;
- Figs. 3 to 12 show subsequent phases through which the subject method is carried out.

BEST MODE OF CARRYING OUT THE INVENTION

With reference to the above mentioned figures,

numeral 1
indicates an endo-osseous screw for fixing the prosthesis to the osteo-gingival area. The endo-osseous screw 1 is made of pure titanium and it is sand-blasted in order to obtain a bigger surface to be adhered by the osseous integration.

The endo-osseous screw 1 has a longitudinal threaded hole 2 that extends from the head of the same screw. The screw head has a transversal notch designed to be engaged by a suitable tool. Such head is in form of a cylindrical section delimited at the bottom by a peripherally enlarged section 1c having e.g. a regular hexagonal cross-section, in order to be engaged by a special socket spanner to which the above mentioned tool is connected.

A tubular spacer cylinder 4, threaded externally for allowing a ring nut 5 to be screwed thereon, is axially joined to the endo-osseous screw 1. The spacer cylinder 4 has at the bottom a widened part 6 forming a kind of a bell designed to cover the head of the endo-osseous screw 1. The ring nut 5 substantially has the same external dimensions as the above mentioned bell 6, so that the mounted implant unit does not exceed the dimension of the bell 6. (see Fig. 2).

The spacer cylinder 4 has also, on the side opposite to the bell, a transversal notch 7, designed to be engaged by a suitable tool. The external surface of the ring nut 5 is knurled for a better incorporation in the connecting bar, as it will be apparent from the description that follows.

The spacer cylinder 4 is designed to be fixed

to the endo-osseous screw 1 by means of a fixing screw 8, that is screwed into the threaded hole 2. It is to be noted that the head 9 of the fixing screw 8, designed to go into abutment against the spacer cylinder 1, is so sized that it passes freely inside the ring nut 5.

Also the spacer cylinder 4, the ring nut 5 and the fixing screw 8 are preferably made of pure titanium.

The subject method is now illustrated with reference to the figures 3 to 12, in which, for sake of clarity, reference is made to a part of the implant prosthesis comprised between a couple of endo-osseous screws, of the type previously described.

As it is seen in fig. 3, the endo-osseous screws 1 are surgically applied to the patient's osteo-gingival area, without caring too much about maintaining them parallel to each other.

The respective spacer cylinders 4 are then mounted on the endo-osseous screws 1 and fixed by the related fixing screws 8. (see Fig. 4). Then the ring nuts 5 are screwed into the spacer cylinder 4 (see Fig. 5). At that moment, a provisional connecting bar 11, of calcinable material, is made and the ring nuts 5 remain incorporated therein (see Fig. 6).

The fixing screws 8 are removed so to allow to detach the connecting bar 11 from the endo-osseous screws 1. The removal of the fixing screws 8 allows, in fact, to remove the spacer cylinders 4, screwed into the ring nuts 5, from the head of the

endo-osseous screws 1. (see Fig. 7).

Subsequently, the spacer cylinders 4 are unscrewed from the ring nuts 5 incorporated in the connecting bar 11 (see Fig. 8). Obviously, the ring nuts 5 remain oriented correspondingly to the endo-osseous screws 1.

The connecting bar 11, comprising the ring nuts 5, is then finished in laboratory. Then a cast is prepared about the connecting bar with plastic refractory material in a known way, the cast being afterwards transferred to a special melting furnace where the calcinable material is substituted with suitable golden alloy. At the end of the melting process, a final connecting bar 12 is obtained, that, in its turn, incorporates the ring nuts 5 in the original orientation (see Fig. 9).

The connecting bar 12 is mounted inside the patient's mouth, on the endo-osseous screws 1, on which the spacer cylinders 4 have been precedently set.

For this purpose the spacer cylinders 4 are screwed into the ring nuts 5 of the bar 12, acting by the suitable tool 13 on the same spacer cylinders (see Fig. 10).

Therefore, the connecting bar 12 is fixed by screwing the fixing screws 8 which pass through the spacer cylinders 4 and engage the endo-osseous screws 1.

It is important to outline the fact that possible level imperfections resulting from the possible twisting of the connecting bar 12 during the melting phase, are eliminated by the screwing

movement of the spacer cylinders 4 in the ring nuts 5 of the bar 12.

Therefore, the connecting bar 12 is fixed in the patient's mouth in the firm and correct way, independently from the parallelism of the endo-osseous screws 1. (see Fig. 11). Finally, an exostructure 14 carrying the actual dental elements is joined to the connecting bar 12 (see Fig. 12).

INDUSTRIAL APPLICABILITY

The described method allows to obtain, in a simple and rapid way, the implant prosthesis, without provoking any inconvenience to the patient who does not have to undergo prolonged and repeated trial sessions and tests.

In fact, the parallelism of the endo-osseous screw is not required for the preparation of the prosthesis, since the ring nuts 5 incorporated in the connecting bar 12 maintain the original position, allowing for a perfect and immediate lining up with the spacer cylinders 4 mounted on the screws 1.

The screwing of the spacer cylinders 4 in the ring nuts 5 of the connecting bar allows also, as has been already noted, make up for possible imperfections resulting from the twisting of the connecting bar 12 during the melting phase.

It is also to be piointed out that, even if any pathology occurred in the post-operation period or, anyway, one of the implant elements appeared defective, it is not necessary to remove the whole

prosthesis, but it is possible to substitute only the above-mentioned defective element.

CLAIMS

1. Method for making implantation prostheses, characterized in that it provides:

applying a plurality of endo-osseous screws, in the patient's osteo-gingival area, said screws being provided with respective tubular spacer cylinders (4), axially mounted by means of respective coaxial fixing screws (8) carrying respective screwed ring nuts (5);

making a provisional connecting bar (11), of calcinable material, in which said ring nuts (5) are incorporated;

detaching said connecting bar (11) from the said endo-osseous screws (1) by unscrewing said fixing screws (8);

removing said spacer cylinders (4) from said ring nuts (5) incorporated in the said connecting bar (11);

making a final connecting bar (12) by melting into a cast obtained from said provisional bar (11) of calcinable material, said final bar (12) incorporating said ring nuts (5) in the original position and orientation;

mounting said connecting bar (12) on said endo-osseous screws (1), onto which said spacer cylinders (4) have been precedently set, said mounting being performed by screwing the spacer cylinders (4) into said ring nuts (5) of the bar (12);

fixing said connecting bar (12) by screwing said fixing screws (8), said screws (8) passing

through said spacer cylinders (4) and engaging the endo-osseous screws (1).

2. Method according to claim 1, characterized in that it provides to set widened parts (6), formed at the bottom of said spacer cylinders (4), respectively on said endo-osseous screws (1), said widened parts (6) forming a kind of bell designed to cover the head of the said endo-osseous screws (1).

3. Method according to claim 1, characterized in that for assemblying said connecting bar (12) on said endo-osseous screws (1), said spacer cylinders (4) are screwed into ring nuts (5) of the same bar (12), acting by a special tool (13) that is designed to engage a transversal notch (7) made at the top of the same spacer cylinders (4).

4. Method according to claim 1, characterized in that for the detachment of said connecting bar (11) from said endo-osseous screws (1) said spacer cylinders (4), screwed to the said ring nuts (5), are removed from the head of the said endo-osseous screws (1).

5. Device for mounting implant prostheses, characterized in that it comprises:

an endo-osseous screw (1) that is designed to be applied in the patient's osteo-gingival area and that has a longitudinal threaded hole (2) extending from the head of the same screw;

a tubular spacer cylinder (4), threaded

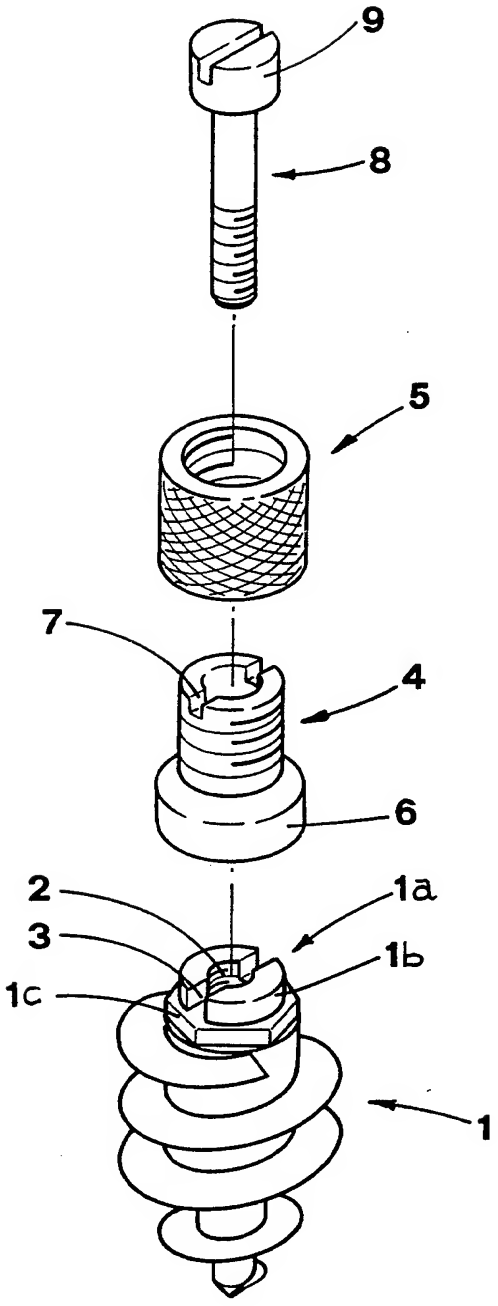
externally and featuing, at the bottom, a widened part (6) forming a kind of bell and designed to be joined axially to said head of the endo-osseous screw (1);

a ring nut (5), dipped firmly in a relative provisional connecting bar (11), or final bar (12), and designed to be screwed on said spacer cylinder (4);

a fixing screw (8) for tightening said spacer cylinder (4) that is designed to be screwed into said threaded hole (2) of said endo-osseous screw (1), the head (9) of said fixing screw (8) being designed to strike against said spacer cylinder (4) and to pass freely through said ring nut (5).

6. Device according to claim 5, characterized in that the head (1a) of of said screw (1) has a transversal notch (3), and is in form of a cylindrical section delimited at the bottom by a peripherally enlarged section (1c) having regular poligonal cross-section, in order to be engaged by a special socket spanner to which the above mentioned tool is connected.

FIG.1



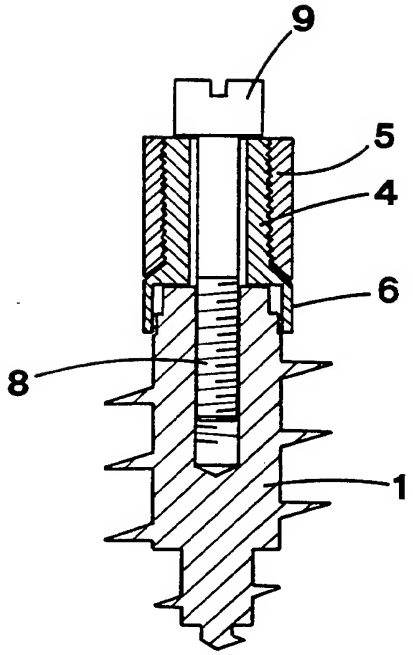


FIG. 2

FIG. 3

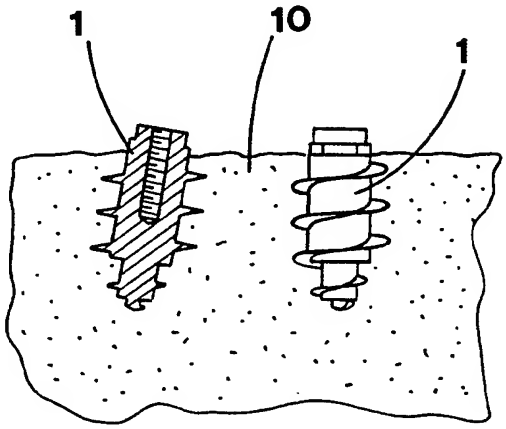


FIG. 4

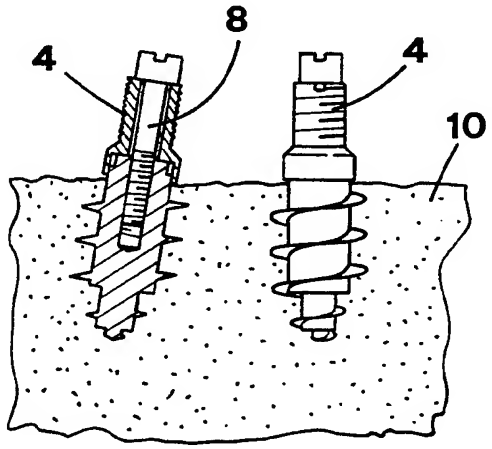


FIG. 5

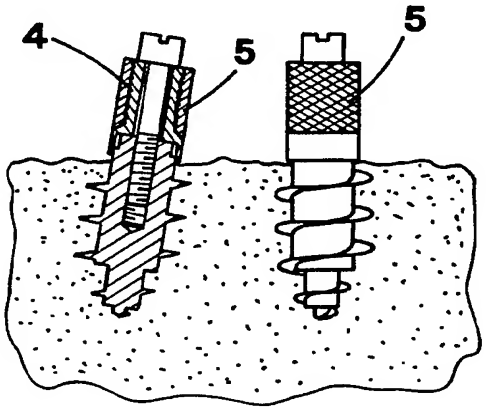


FIG. 6

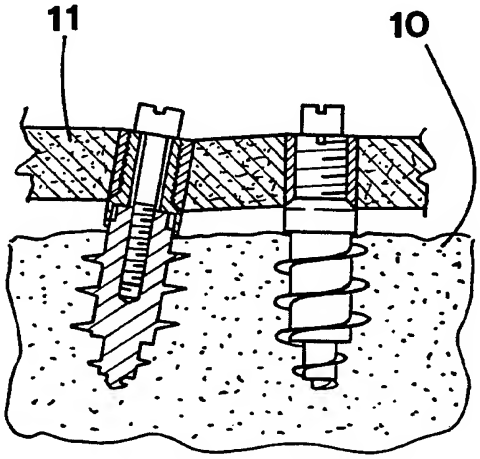


FIG. 7

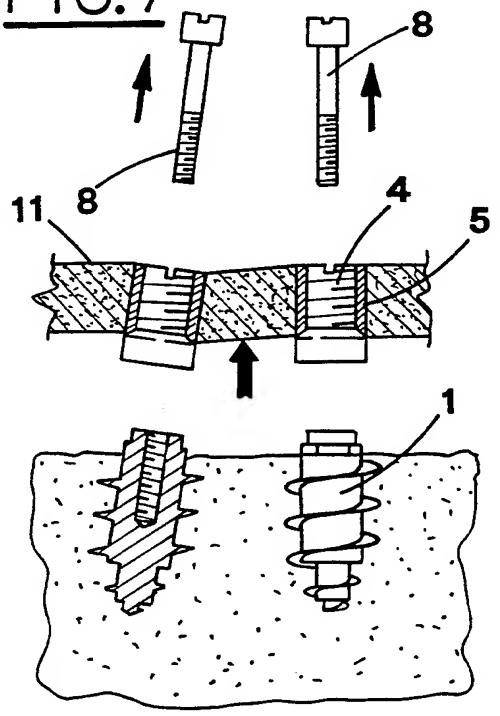


FIG. 8

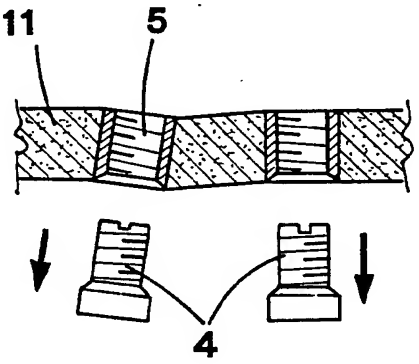


FIG. 9

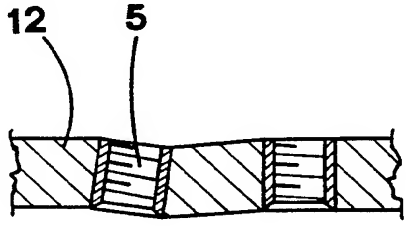


FIG. 10

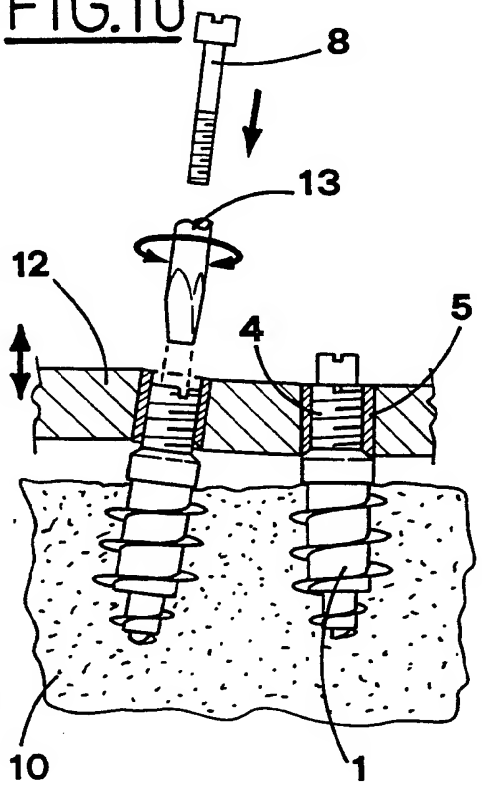


FIG. 11

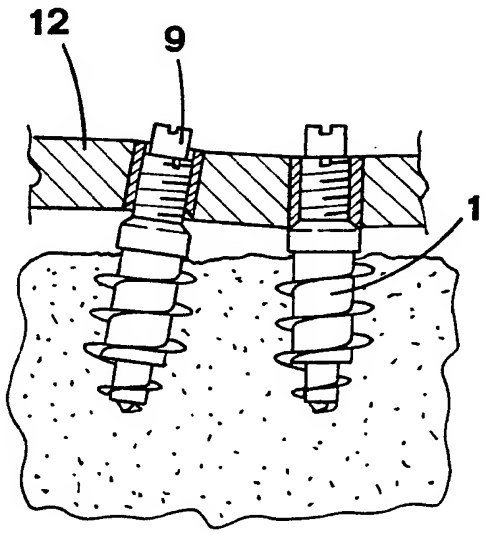
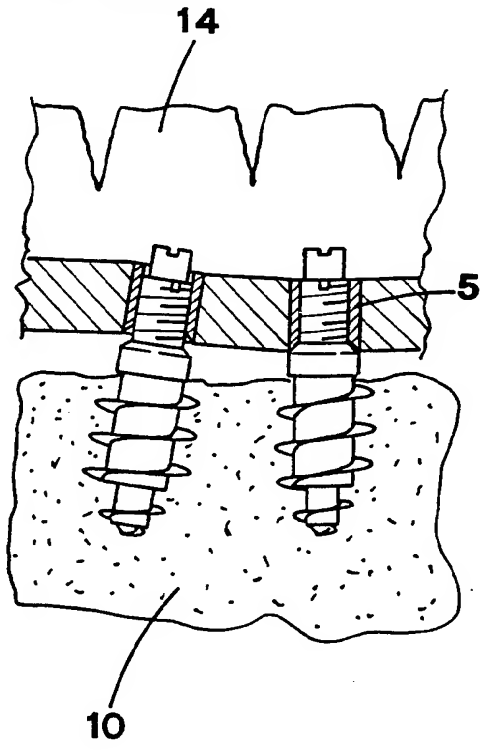


FIG 12



INTERNATIONAL SEARCH REPORT

Int onal Application No
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A. CLASSIFICATION OF SUBJECT MATTER
IPC 5 A61C13/00 A61C8/00

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B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
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Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

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C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US,A,4 976 739 (DUTHIE) 11 December 1990 see column 6, line 53 - column 8, line 37; figures 5-8	1-6
Y	EP,A,0 288 446 (ASTRA MEDITEC AB) 26 October 1988 see the whole document	1-6
A	US,A,5 106 300 (WOITIK) 21 April 1992 see the whole document	1,5
A	EP,A,0 498 923 (HERAEUS KULZER) 19 August 1992 see the whole document	1,2

[ ] Further documents are listed in the continuation of box C.

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Patent document cited in search report	Publication date	Patent family member(s)		Publication date
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US-A-5106300	21-04-92	NONE		
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